Name of Organization: Ohio University

Type of Organization: College or University

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Project Title: Effects of Three Eagles Wetland on Sediments of Green Creek

Project Category: Contaminated Sediments

Rank by Organization (if applicable): 1

Total Funding Requested ($): 195,761 **Project Duration:** 2 Years

Abstract:

Green Creek, draining to Lake Erie, was re-channelized resulting in stream cut-offs in the Sandusky County of Ohio. The Ohio Wetlands Corporation has built a riparian wetland, namely Three Eagles Wetland, in the area of stream cut-offs. The proposed project is to investigate effects of the built wetland on sediments of Green Creek. It will investigate the restored wetland's ability to enhance sediment management within a watershed heavily impacted by agricultural erosion. The baseline of sediment, i.e. the inflow load, will be gathered and analyzed from the upstream channel of Green Creek before draining to the wetland. The outflow load from the wetland will be monitored, analyzed, and compared with the baseline sediment. Further, the wetland area will be delineated using the geographic information system (GIS) to locate representative sites for sediment sampling. Sediment deposits in the wetland will be sampled, analyzed using X-ray diffraction, and regionalized using GIS. This is to establish a possible mass balance in terms of sedimentation to investigate effects of the built wetland on sediments of Green Creek. The Ohio University and the Ohio Wetlands Corporation will collaboratively conduct the study and each will provide in-kind supports for the project. The proposed research will immediately benefit the Great Lakes region by restoring the stream cut-offs and managing sediments draining to Lake Erie. Findings and results derived from the study will provide the guidance to use riparian wetlands for enhancing sediment management and restoring stream cut-offs in the Great Lakes region and nationwide.

Geographic Areas Affected by the Project

States:

☐ Illinois	☐ New York	☐ Superior	☒ Erie
☐ Indiana	☐ Pennsylvania	☐ Huron	☐ Ontario
☐ Michigan	☐ Wisconsin	☐ Michigan	☐ All Lakes
☐ Minnesota	☒ Ohio		

Geographic Initiatives:

☐ Greater Chicago ☒ NE Ohio ☐ NW Indiana ☐ SE Michigan ☐ Lake St. Clair

Primary Affected Area of Concern: Black River, OH

Other Affected Areas of Concern: Greek Creek in Ohio draining to Lake Erie

For Habitat Projects Only:

Primary Affected Biodiversity Investment Area:

Other Affected Biodiversity Investment Areas:

Problem Statement:

The meandering of a river or stream will inevitably result in significant sediment deposits and lead to floods in the surrounding areas. Natural or man-made cut-offs of streams due to channelization may eventually follow. The Green Creek channelization and cut-offs in the Sandusky County of Ohio is one of many examples. Because of economic development and engineering concern, re-channelization projects become desirable and have resulted in numerous cut-offs of streams or rivers in the Great Lakes region and other places in the country. How should these stream cut-offs and sediments be managed to avoid adverse alterations of natural environment? How can the damage due to sediment alterations of water regimes be reduced? This has been a debatable issue for almost all projects involved with channelization and cut-offs. The proposed study will investigate effects of a built wetland for enhancing sediment management and restoring stream cut-offs resulted from the Green Creek channelization in the Lake Erie region.

Proposed Work Outcome:

Work Plan

The project site for the study is located in the Sandusky County of Ohio and consists of around 160-acre land in the stream cut-off area of Green Creek draining to Lake Erie. The Ohio Wetland Corporation has built a wetland mitigation bank, namely Three Eagles Wetland, for restoring the cut-offs of Green Creek. Effects of the built wetland on sediments of Green Creek will be investigated to develop the guidance for enhancing sediment management and restoring stream cut-offs using riparian wetlands. The following is to outline the proposed work:

To consult with the manager of the Ohio Wetland Corporation who is responsible for the Three Eagles Wetland for the installation of monitoring and sampling devices. To install inflow sampling station before draining to the wetland to establish sediment baseline. To install outflow sampling station at the outlet of the built wetland to monitor sediment outflow. To analyze inflow and outflow sediment loads for comparison.

To delineate the Three Eagles Wetland and the associated watershed using geographical information system (GIS). To determine representative sites for sediment sampling in the wetland by GIS based on topographical and geographic maps. To consult and work with the manager of the Ohio Wetland Corporation for sediment sampling in the wetland. To analyze sediment samples using X-ray diffraction. To conduct the regionalization analysis and to establish the mass balance by combining the results from inflow and outflow loads.

To summarize findings based on the results from monitoring, sampling, and analysis. To prepare a final report and guidance for using wetland mitigation banks to restore stream cut-offs and to manage sediments. The results of this proposed project will immediately benefit the Lake Erie region by enhancing sediment management and restoring the abandoned stream cut-offs of Green Creek draining to the lake. Findings and results derived from the research will provide the guidance for using riparian wetlands to restore stream cut-offs and to enhance sediment management in the Great lake region.

Project Outcomes

The research findings and results will be summarized, published, and presented in the international and national conferences and symposia such as those sponsored by American Society of Civil Engineers and American Water Resources Association. The success of the proposed project will immediately provide a demonstration model to use wetlands for restoring stream cut-offs and enhancing sediment management in the Lake Erie region. The Ohio Wetlands Corporation will use this as a live example for operation of wetlands to enhance sediment management and to restore stream cut-offs in the Great Lakes region and nationwide.

Project Milestones:	**Dates:**
Inflow/outflow monitoring stations	07/2000
Sediment sampling/analysis	08/2000
Wetland delineation/sampling sites	01/2001
Sampling/X-ray analysis	05/2001
Regionalization analysis by GIS	08/2001
Mass balance analysis/comparison	01/2002
Draft report	03/2002
Final report	06/2002

☐ Project Addresses Environmental Justice

If So, Description of How:

☒ Project Addresses Education/Outreach

If So, Description of How:

Findings and results derived from this study will provide the guidance for engineers and managers to operate riparian wetlands for restoring stream cut-offs and enhancing sediment management in the Great Lakes region and nationwide. The proposed project will educate graduate students who will work on the restoration and management of stream cut-offs and sediments using wetlands. The manager of the Ohio Wetlands Corporation will be benefited from the results of the project through the process of monitoring and investigating sediments related to the built wetland.

Project Budget:

	Federal Share Requested ($)	Applicant's Share ($)
Personnel:	102,943	0
Fringe:	15,059	0
Travel:	6,150	0
Equipment:	2,220	0
Supplies:	10,250	0
Contracts:	0	0
Construction:	0	0
Other:	0	26,179
Total Direct Costs:	136,622	26,179
Indirect Costs:	59,139	0
Total:	195,761	26,179
Projected Income:	0	0

Funding by Other Organizations (Names, Amounts, Description of Commitments):

The Ohio University will provide tuition waivers of $26,179 for the graduate students working on the proposed study. The Ohio Wetland Corporation will contribute a matching fund of $25,920 if the project is funded.

Description of Collaboration/Community Based Support:

The project director will collaborate with the Ohio Wetlands Corporation for conducting the proposed study. The Ohio Wetland Corporation will assist to install inflow and outflow monitoring stations and sediment sampling sites in the built wetland for the project if it is funded.

Dr. Elizabeth Gierlowski-Kordesch, who specializes in sedimentology at Ohio University, particularly deposition of sediments, will be a co-investigator. Her specialty in mineralogy and sediment through the use of geologic methods augmented with X-ray diffraction will strengthen the proposed study.